

# High Performance Negative Feedback Near Infrared Single Photon Counting Detectors & Arrays, Phase II

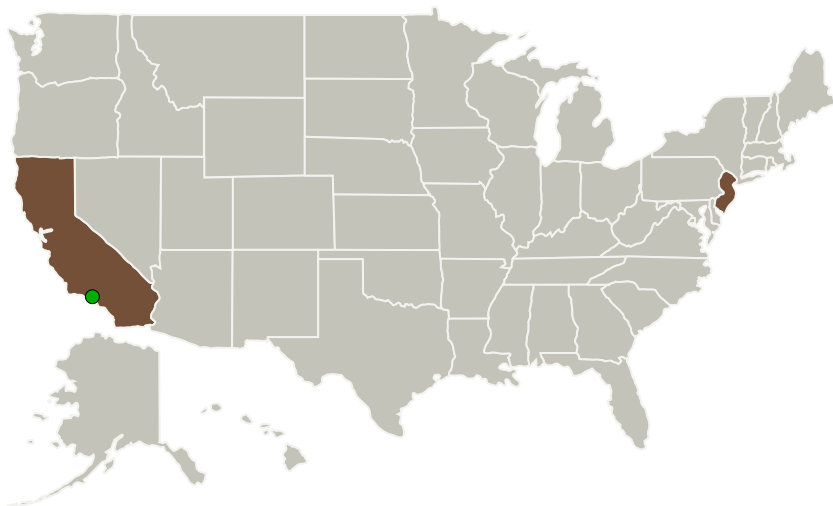
Completed Technology Project (2011 - 2013)



## Project Introduction

Amplification Technologies Inc ("ATI") proposes to develop the enabling material and device technology for the design of ultra low noise, high gain and high speed near-infrared single photon counting photodetectors and arrays sensitive in the 1000 nm to 1600 nm spectral region for long range space communication applications, based on the already proven mechanism of internal discrete amplification technology in InGaAs/InP material system. We plan to achieve this by using the concept of internal discrete amplification mechanism in the InP material system that gave state of the art performance parameters in the 1000 to 1600nm wavelength range and the developed device design as part of the Phase I program that shows higher detection efficiency and lower jitter performance. The primary accomplishments from the Phase II effort would be the development of ultra low noise (low jitter), high detection efficiency, very high gain and high speed near-infrared photodetectors and arrays sensitive in the 1000 nm to 1600 nm spectral region. The technology of internal discrete amplification enables the combination of high speed, very high gain and ultra low noise because the internal discrete amplification nullifies the effect of impact ionization coefficients and prevents the edge break down, with high detection efficiency and high speed of operation. These photodetectors might also be used in missile seekers, battlefield target identification and recognition systems, and eye-safe LADAR. Potential civilian applications include fiber-optic telecommunications, remote sensing and laser spectroscopy.

## Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Amplification Technologies, Inc.	Lead Organization	Industry	Paramus, New Jersey
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations	
California	New Jersey

## Project Transitions

**June 2011:** Project Start

**May 2013:** Closed out

**Closeout Summary:** High Performance Negative Feedback Near Infrared Single Photon Counting Detectors & Arrays, Phase II Project Image

**Closeout Documentation:**

- Final Summary Chart Image(<https://techport.nasa.gov/file/138924>)

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

Amplification Technologies, Inc.

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

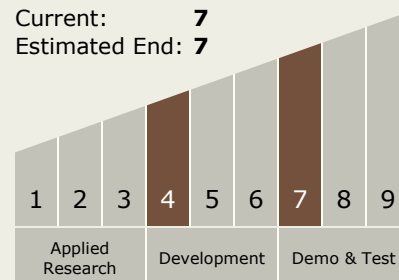
Carlos Torrez

**Principal Investigator:**

Rafael Ben Michael

## Technology Maturity (TRL)

Start: 4  
Current: 7  
Estimated End: 7



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## Technology Areas

### Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
  - └ TX05.1 Optical Communications
    - └ TX05.1.1 Detector Development

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System